

WHAT IS CLAIMED IS:

1. A composition, stabilized against the formation of aldehydic contaminants during melt processing of said composition, which comprises

(a) a polyester or polyamide, and

(b) an effective stabilizing amount of at least one compound selected from the group consisting of

i.) hydroxylamine stabilizers,

ii.) substituted hydroxylamine stabilizers,

iii.) nitron stabilizers, and

iv.) amine oxide stabilizers.

2. A composition according to claim 1 wherein the polyester or polyamide of component (a) is 95-99.99 % by weight and the stabilizers of component (b), in total, are 5 to 0.01 % by weight, based on the total weight of (a) and (b).

3. A composition according to claim 2 wherein component (a) is 98-99.99 % by weight and component (b) is 2 to 0.01 % by weight, based on the total weight of (a) and (b).

4. A composition according to claim 3 wherein component (a) is 99-99.97 % by weight and component (b) is 1 to 0.03 % by weight, based on the total weight of (a) and (b).

5. A composition according to claim 1 wherein the polyester of component (a) has dicarboxylic acid repeat units selected from the group consisting of aromatic dicarboxylic acids having 8 to 14 carbon atoms, aliphatic dicarboxylic acids having 4 to 12 carbon atoms, cycloaliphatic dicarboxylic acids having 8 to 12 carbon atoms, and mixtures thereof.

6. A composition according to claim 5 wherein the dicarboxylic acid is terephthalic acid, isophthalic acid, o-phthalic acid, naphthalene dicarboxylic acid, cyclohexane dicarboxylic acid, cyclohexanediactic acid, diphenyl-4,4'-dicarboxylic acid, succinic acid, glutaric acid, adipic acid, sebacic acid and mixtures thereof.

7. A composition according to claim 6 wherein the dicarboxylic acid is terephthalic acid or 2,6-naphthalene dicarboxylic acid.

8. A composition according to claim 1 wherein the diol portion of the polyester of component (a) is derived from the generic formula HO-R-OH where R is an aliphatic, cycloaliphatic or aromatic moiety of 2 to 18 carbon atoms.

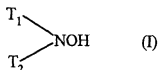
9. A composition according to claim 8 wherein the diol is ethylene glycol, diethylene glycol, triethylene glycol, propane-1,3-diol, butane-1,4-diol, pentane-1,5-diol, hexane-1,6-diol, 1,4-cyclohexanedimethanol, 3-methylpentane-2,4-diol, 2-methylpentane-1,4-diol, 2,2-diethylpropane-1,3-diol, 1,4-di-(hydroxyethoxy)benzene, 2,2-bis(4-hydroxycyclohexyl)-propane, 2,4-dihydroxy-1,1,3,3-tetramethylcyclobutane, 2,2-bis-(3-hydroxyethoxyphenyl)propane, 2,2-bis-(4-hydroxypropoxyphenyl)ethane and mixtures thereof.

10. A composition according to claim 9 wherein the diol is ethylene glycol.

11. A composition according to claim 1 wherein the polyester of component (a) is poly(ethylene terephthalate) PET or poly(ethylene 2,6-naphthalene-2,6-dicarboxylate).

12. A composition according to claim 11 wherein the polyester is poly(ethylene terephthalate).

13. A composition according to claim 1 in which the hydroxylamine stabilizers of component i.) are of the formula (I)



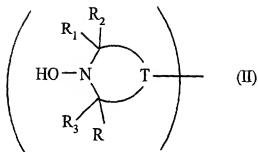
wherein

T_1 is straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms; and

T_2 is hydrogen, or independently has the same meaning as T_1 ;

or

the hydroxylamine stabilizers of component i.) are compounds that contain one or more of the groups of the formula (II)



wherein

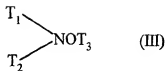
T is a group forming a five- or six-membered ring; and

R₁, R₂, R₃ and R₄ are independently hydrogen, alkyl of 1 to 4 carbon atoms or phenyl.

14. A composition according to claim 1 in which the hydroxylamine stabilizers of component i.) are selected from the group consisting of N,N-dibenzylhydroxylamine, N,N-diethylhydroxylamine, N,N-diethylhydroxylamine, N,N-dioctylhydroxylamine, N,N-dilaurylhydroxylamine, N,N-didodecylhydroxylamine, N,N-ditetradecylhydroxylamine, N,N-dihexadecylhydroxylamine, N,N-dioctadecylhydroxylamine, N-hexadecyl-N-tetradecylhydroxylamine, N-hexadecyl-N-heptadecylhydroxylamine, N-hexadecyl-N-octadecylhydroxylamine, N-heptadecyl-N-octadecylhydroxylamine, N-methyl-N-octadecylhydroxylamine and N,N-di(hydrogenated tallow)hydroxylamine.

15. A composition according to claim 1 in which component i.) is the N,N-di(alkyl)hydroxylamine produced by the direct oxidation of N,N-di(hydrogenated tallow)amine.

16. A composition according to claim 1 in which the substituted hydroxylamine stabilizers of component ii.) are of the formula (III) or (IV)



wherein

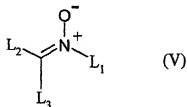
T_1 is straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms;

T_2 is hydrogen, or independently has the same meaning as T_1 ; and

T_3 is allyl, straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 18 carbon atoms, cycloalkenyl of 5 to 18 carbon atoms or a straight or branched chain alkyl of 1 to 4 carbon atoms substituted by phenyl or by phenyl substituted by one or two alkyl groups of 1 to 4 carbon atoms or by 1 or 2 halogen atoms.

17. A composition according to claim 1 in which component ii.) is O-allyl-N,N-dioctadecylhydroxylamine or O-n-propyl-N,N-dioctadecylhydroxylamine or N,N-di(hydrogenated tallow)acetoxamine.

18. A composition according to claim 1 in which the nitron stabilizers of component iii.) are of the formula (V)



wherein

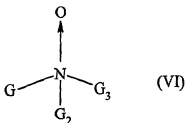
L₁ is straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms; and

L₂ and L₃ are independently hydrogen, straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms;

or L₁ and L₂ together form a five- or six-membered ring including the nitrogen atom.

19. A composition according to claim 1 in which the nitrone stabilizers of component iii.) are selected from the group consisting of N-benzyl- α -phenylnitron, N-ethyl- α -methylnitron, N-octyl- α -heptylnitron, N-lauryl- α -undecylnitron, N-tetradecyl- α -tridcylnitron, N-hexadecyl- α -pentadecylnitron, N-octadecyl- α -heptadecylnitron, N-hexadecyl- α -heptadecylnitron, N-octadecyl- α -pentadecylnitron, N-heptadecyl- α -heptadecylnitron, N-octadecyl- α -hexadecylnitron, N-methyl- α -heptadecylnitron and the nitron derived from N,N-di(hydrogenated tallow)hydroxylamine.

20. A composition according to claim 1 in which the amine oxide stabilizers of component iv.) are of the formula (VI)



wherein

G₁ and G₂ are independently a straight or branched chain alkyl of 6 to 36 carbon atoms, aryl of 6 to 12 carbon atoms, aralkyl of 7 to 36 carbon atoms, alkaryl of 7 to 36 carbon atoms, cycloalkyl of 5 to 36 carbon atoms, alkycycloalkyl of 6 to 36 carbon atoms or cycloalkylalkyl of 6 to 36 carbon atoms;

G₃ is a straight or branched chain alkyl of 1 to 36 carbon atoms, aryl of 6 to 12 carbon atoms, aralkyl of 7 to 36 carbon atoms, alkaryl of 7 to 36 carbon atoms, cycloalkyl of 5 to 36 carbon atoms, alkycycloalkyl of 6 to 36 carbon atoms or cycloalkylalkyl of 6 to 36 carbon atoms; with the proviso that at least one of G₁, G₂ and G₃ contains a carbon-hydrogen bond; and

wherein said aryl groups may be substituted by one to three halogen, alkyl of 1 to 8 carbon atoms, alkoxy of 1 to 8 carbon atoms or combinations thereof; and

wherein said alkyl, aralkyl, alkaryl, cycloalkyl, alkycycloalkyl and cycloalkylalkyl groups may be interrupted by one to sixteen -O-, -S-, -SO-, -SO₂-, -COO-, -OCO-, -CO-, -NG₄-, -CONG₄- and -NG₄CO- groups, or wherein said alkyl, aralkyl, alkaryl, cycloalkyl, alkycycloalkyl and cycloalkylalkyl groups may be substituted by one to sixteen groups selected from -OG₄-, -SG₄-, -COOG₄-, -OCOG₄-, -COG₄-, -N(G₄)₂-, -CON(G₄)₂-, -NG₄COG₄ and 5- and 6-membered rings containing the -C(CH₃)(CH₂R_x)NL(CH₂R_x)(CH₃)C- group or wherein said alkyl, aralkyl, alkaryl, cycloalkyl, alkycycloalkyl and cycloalkylalkyl groups are both interrupted and substituted by the groups mentioned above; and

wherein

G₄ is independently hydrogen or alkyl of 1 to 8 carbon atoms;

R_x is hydrogen or methyl;

L is hydrogen, hydroxy, C₁₋₃₀ straight or branched chain alkyl moiety, a -C(O)R moiety where R is a C₁₋₃₀ straight or branched chain alkyl group, or a -OR_y moiety; and

R₁ is C₁₋₃₀ straight or branched chain alkyl, C_{2-C₃₀} alkenyl, C_{2-C₃₀} alkynyl, C_{5-C₁₂} cycloalkyl, C_{6-C₁₀} bicycloalkyl, C_{5-C₈} cycloalkenyl, C_{6-C₁₀} aryl, C_{7-C₉} aralkyl, C_{7-C₉} aralkyl substituted by alkyl or aryl, or -CO(D), where D is C_{1-C₁₈} alkyl, C_{1-C₁₈} alkoxy, phenyl, phenyl substituted by hydroxy, alkyl or alkoxy, or amino or amino mono- or di-substituted by alkyl or phenyl.

21. An composition according to claim **20** in which in the amine oxide stabilizers of formula (VI), G₁ and G₂ are independently alkyl groups of 8 to 26 carbon atoms and G₃ is methyl.

22. A mono- or multi-layered plastic container or film, stabilized against the formation of aldehydic contaminants during melt processing of said container or film, comprising at least one layer which comprises

- (a) a polyester or polyamide, and
- (b) an effective stabilizing amount of at least one compound selected from the group consisting of
 - i.) hydroxylamine stabilizers,
 - ii.) substituted hydroxylamine stabilizers,
 - iii.) nitron stabilizers, and
 - iv.) amine oxide stabilizers.

23. A plastic container according to claim **22** which is a rigid bottle.

24. A process for preventing the formation of aldehydic contaminants during melt processing of a polyester or polyamide which comprises

incorporating into said polyester or polyamide an effective stabilizing amount of at least one compound selected from the group consisting of

- i.) hydroxylamine stabilizers,
- ii.) substituted hydroxylamine stabilizers,
- iii.) nitron stabilizers, and
- iv.) amine oxide stabilizers.

25. A composition, stabilized against the formation of aldehydic contaminants during melt processing of said composition, which comprises

(a) a polyester or polyamide, and

(b) an effective stabilizing amount of at least one compound selected from the group consisting of

- i.) hydroxylamine stabilizers,
- ii.) substituted hydroxylamine stabilizers,
- iii.) nitron stabilizers, and
- iv.) amine oxide stabilizers, and

optionally

(c) an effective stabilizing amount of a polymer which is poly(vinyl alcohol) or an ethylene/vinyl alcohol copolymer, and

optionally

(d) an effective stabilizing amount of a polyhydric alcohol, and

optionally

(e) an effective stabilizing amount of a polymer which is polyacrylamide, polymethacrylamide or an acrylamide or methacrylamide copolymer with at least one ethylenically unsaturated comonomer,

wherein

the polyhydric alcohol is of the formula $E-(OH)_n$

where

n is 2 to 4000, and

E is a hydrocarbyl moiety.

26. A composition according to claim 25 in which the polyhydric alcohol is trimethylolpentane, pentaerythritol or dipentaerythritol.

27. A composition, stabilized against the formation of aldehydic contaminants and against yellowing during melt processing of said composition, which comprises

(a) a polyester or polyamide, and

(b) an effective stabilizing amount of at least one compound selected from the group consisting of

- i.) hydroxylamine stabilizers,
- ii.) substituted hydroxylamine stabilizers,
- iii.) nitron stabilizers, and
- iv.) amine oxide stabilizers, and

one or more colorants selected from the group consisting of pigments and dyes.

28. A composition according to claim 1 which is a fiber, film or molded article.